

## ON THE AUSTRALIAN SPECIES OF JAPYGIDAE (THYSANURA).

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Most of our knowledge of the Japygidae of Australia, and of the world as a whole, is due to that great authority on the group, Prof. F. Silvestri.

Hitherto the following twelve species have been described from Australasia, eight of them being confined to Australia:—

<i>Japyx longiseta</i> Silv.	-	-	-	West Australia
<i>Japyx mjobergi</i> Silv.	-	-	-	Queensland
<i>Japyx tillyardi</i> Silv.	-	-	-	South Australia
<i>Japyx leae</i> Silv.	-	-	-	Tasmania
<i>Japyx froggatti</i> Silv.	-	-	-	New South Wales
<i>Japyx michaelsoni</i> Silv.	-	-	-	West Australia
<i>Indjapyx papuasicus</i> Silv.	-	-	-	Papua
<i>Indjapyx sharpi</i> Silv.	-	-	-	Hawaii
<i>Heterojapyx novae-hollandiae</i> Verh.	-	-	-	New Zealand
<i>Heterojapyx victoriae</i> Silv.	-	-	-	Victoria
<i>Heterojapyx gallardi</i> Till.	-	-	-	New South Wales
<i>Parajapyx samoanus</i> Silv.	-	-	-	Samoa

In this paper are described three new species of *Japyx*, two of *Heterojapyx* and one of *Parajapyx*. In addition, new records extend the range of distribution of some of these species within Australia.

I am greatly indebted to many friends for the opportunity of studying the material dealt with in this paper, and tender my thanks to them. In particular I would mention Prof. G. E. Nicholls and his students of Perth University who, in January, 1933, visited the south-west of Western Australia and brought back what probably constitutes one of the largest collections of these insects ever made in a single locality; no fewer than twenty-nine specimens were obtained, representing two known and one new species. Other specimens have been received from Western Australia through the kindness and enthusiasm of Mr. L. J. Glauert (of the Perth Museum) and Mr. D. C. Swan. In addition, I have other examples personally collected in the same State in 1931-2.

From Dr. R. J. Tillyard I have received material collected on Mount Kosciusko, Federal Territory. Mr. J. W. Evans also found a specimen in the same region, and in addition has given me a number of specimens from the Nelson District of New Zealand. In South Australia a number have been collected by Dr. J. Davidson, Mr. D. C. Swan, and the writer.

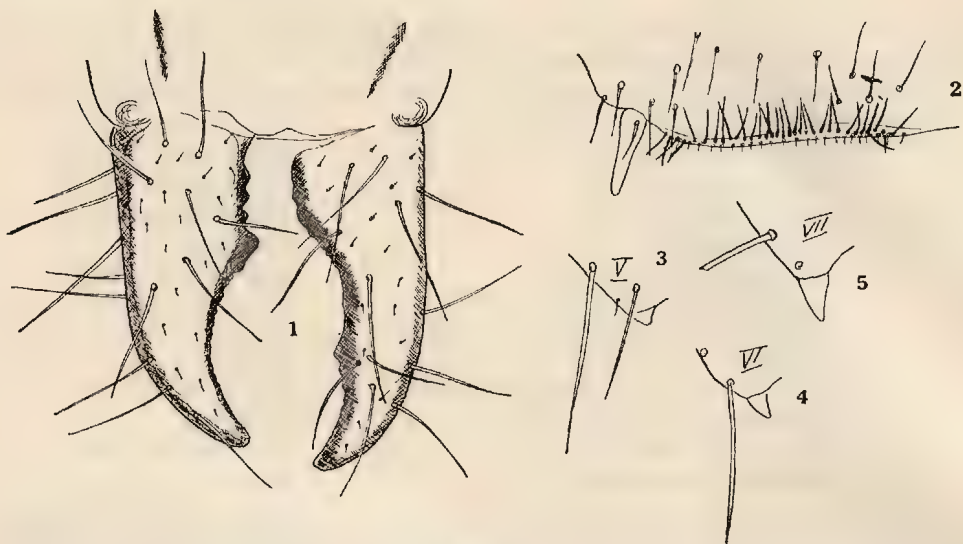
In the collections of the South Australian Museum there were previously two specimens, mounted on card, collected by the late Mr. A. M. Lea in Queensland and New South Wales.

The specific characters of the Japygidae are so obscure that it is very difficult to construct a serviceable key for their separation. At the conclusion of this paper I have attempted a key to the Australian species, which it is hoped will be serviceable as far as these species are concerned. It is, however, essential to consider the full description of each species before a final determination can be made.

Genus JAPYX Halliday, 1863.

JAPYX TILLYARDI Silv., 1930.

Of this species I have seen eight specimens altogether, all taken by Prof. Nicholls and his students. The localities and the number of specimens from each are:—Frankland River, South-West Australia, January, 1933 (2); Walpole Inlet, South-West Australia, January, 1933 (2); and Swarbrick, South-West Australia, January, 1933 (4).



Figs. 1-5.

*Japyx tillyardi* Silv.—1, forceps from above; 2, subcoxal organ of first abdominal sternite; 3, 4, 5, postero-lateral corners of tergites V., VI., and VII., respectively.

A close study of this material shows some minor differences from the description as given by Silvestri of the type from Mount Lofty, South Australia. The most important is that in all specimens the postero-lateral corners of tergite V. are slightly produced and not rounded.

JAPYX FROGGATTI Silv., 1930.

Sixteen specimens of this species were collected by Prof. Nicholls' party at Walpole Inlet, South-West Australia, in January, 1933. I have also seen a single specimen taken at Pinjarra, West Australia in September, 1931, by Mr. D. C. Swan.

JAPYX MICHAELSENI Silv., 1930.

Syn. *Japyx longiseta* Silv., 1908 (*ad partem*).

This species was originally described from West Australia, but I have a specimen collected by Mr. J. W. Evans at Whangamoia, near Nelson, New Zealand, in which I can detect no difference from Silvestri's description.

JAPYX MJÖBERGI Silv., 1928.

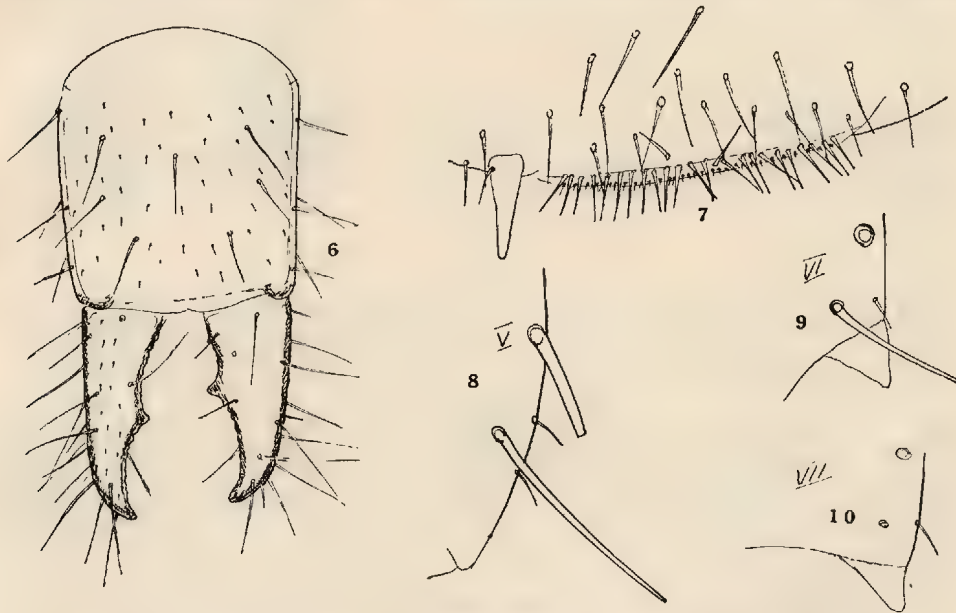
I have before me two specimens which conform to the description of this species. One was found in soil in my garden at Glen Osmond, Adelaide, South Australia, in 1933. The other was taken by Mr. Swan, also at Glen Osmond, in May of the same year.

## JAPYX LONGISETA Silv., 1908.

A single example collected by Mr. Swan at Pinjarra, West Australia, in September, 1931, can be referred to this species.

*Japyx westraliense*, n. sp.

*Description*.—Colour, cream, except on abdominal segments VIII.-X., which are yellowish, and the forceps, which are of a still deeper yellow. Head above with 15-16 long setae and a few shorter ones on each side. Antennae 24-segmented, segment III. rather longer than wide, the longer setae 0.15 mm., segment X. as wide as long, ultimate and penultimate segments only slightly elongated, the last slightly shorter than the last but one, all segments except the last two with the setae in two well-defined rows, the last with the setae not so orientated, sensory setae on IV.-VI. 3-3-4, these slightly shorter than the ordinary setae; maxillary palpi with 4 pectinate inner lamellae and an inner process; labial palpi elongate



Figs. 6-10.

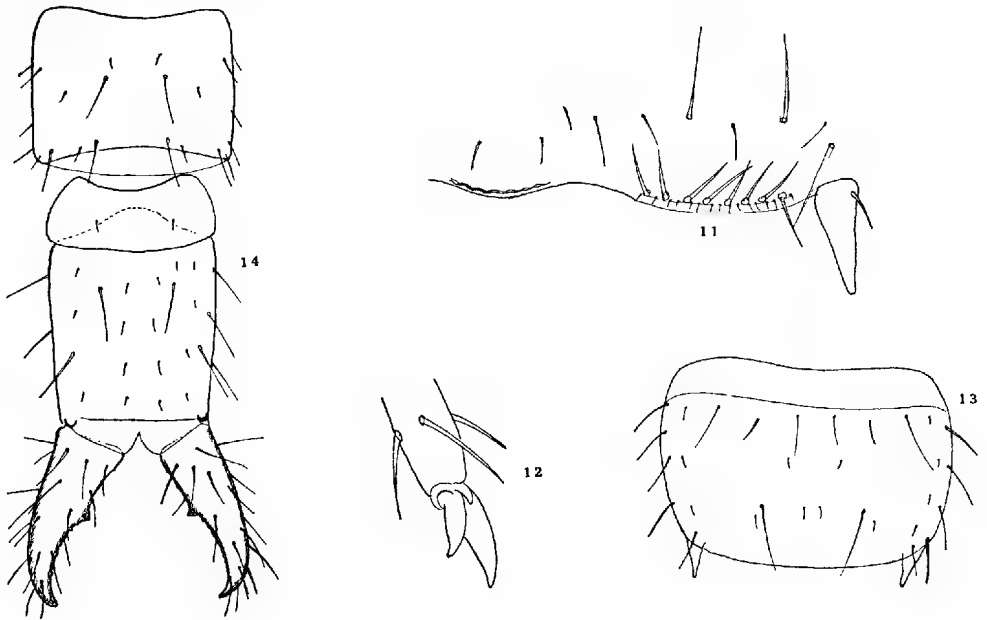
*Japyx froggatti* Silv.—6, segment X. and forceps from above; 7, subcoxal organ of first abdominal sternite; 8, 9, 10, postero-lateral corners of tergites V., VI., and VII., respectively.

380  $\mu$ . long by 180  $\mu$ . wide. Thorax: pronotum with 3 very long setae on each side, 4 shorter ones on each side and a few others still shorter; meso- and metanotum with 2 long submedial setae on the praescutum, 3 very long setae, 2 shorter ones and a few still shorter on each side of scutum. Legs: tarsus twice as long as praetarsus with 3 + 3 setae below; hind claw about twice as long as front claw, median claw small but well developed. Abdomen: tergite I. with a pair of fairly submedial praescutal setae and a pair of rather long submedial subposterior scutal setae; tergite II. with a pair of rather short submedial praescutal setae and 3 long, 3 short and a few shorter setae on each side of the scutum; III.-VII. with 6 long, 3 short and some shorter setae on each side; VIII. with 4 long setae on each side; postero-lateral angles of tergites V.-VI. rounded, VII. produced in a short finger-like process, VIII. rounded. First abdominal sternite as figured. Stylets and vesicles normal. Segment X.

of abdomen about one-third longer than wide, very slightly tapering behind, lateral carinae indistinct, with one median subanterior seta, 6 long setae and other short and still shorter ones on each side. Forceps symmetrical, each arm with a large praemedial tooth, between this and the base with 2-3 small rounded tubercles, and postdentally with 10 gradually diminishing tubercles. Length of animal, 7-8 mm.

*Holotype* and *allotype* from Pinjarra, West Australia, September 28, 1931, collected by Mr. Swan. Another example was taken at Goyamin Pool, Chittering, West Australia, by Mr. Swan on October 19, 1931, and I found one myself at Kelmscott, West Australia, in 1932. Two more were collected by Prof. Nicholls at Armadale, West Australia, in June, 1932.

The relationships of this species to others of the genus are best given by the key.



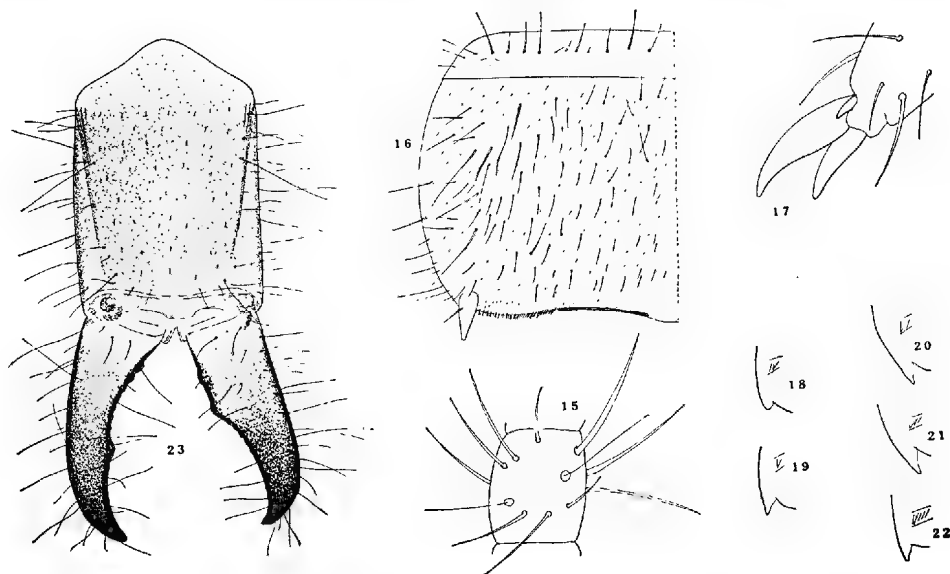
Figs. 11-14.

*Japyx westraliense*, n. sp.—11, subcoxal organ of first abdominal sternite; 12, foot; 13, tergite VII.; 14, abdominal segments VIII.-X. and forceps from above.

#### *Japyx glauerti*, n. sp.

*Description*.—Colour, deep yellowish cream, considerably darker on abdominal segments VIII.-X., and still more so on forceps, especially towards the tips. Head: antennae 42 segmented, sensory hairs on IV.-VI. as in other species. Abdominal tergites with the postero-lateral angles produced in IV.-VIII., as figured. Tarsal claws as in other species (*cf.* fig.). Subcoxal organ on first abdominal sternite as figured. Abdominal segment X. slightly longer than wide with distinct lateral carinae. Forceps longer than segment X., asymmetrical, left arm with a postmedian tooth, between this and the base with  $\frac{3}{4}$  teeth gradually diminishing towards large tooth, the basal ones being rather flattened, postdentally the inner edge of arm is crenulate; right arm with large praemedial tooth, between this and the base with a single rather large tubercle, from tooth to apex strongly concave with 13 to 14 tubercles gradually diminishing into crenulations. Length of animal, 28 mm.

*Type*.—A single specimen collected by Mr. L. J. Glauert, of the Perth Museum, at the Serpentine Falls, West Australia, in 1925.



Figs. 15-23.

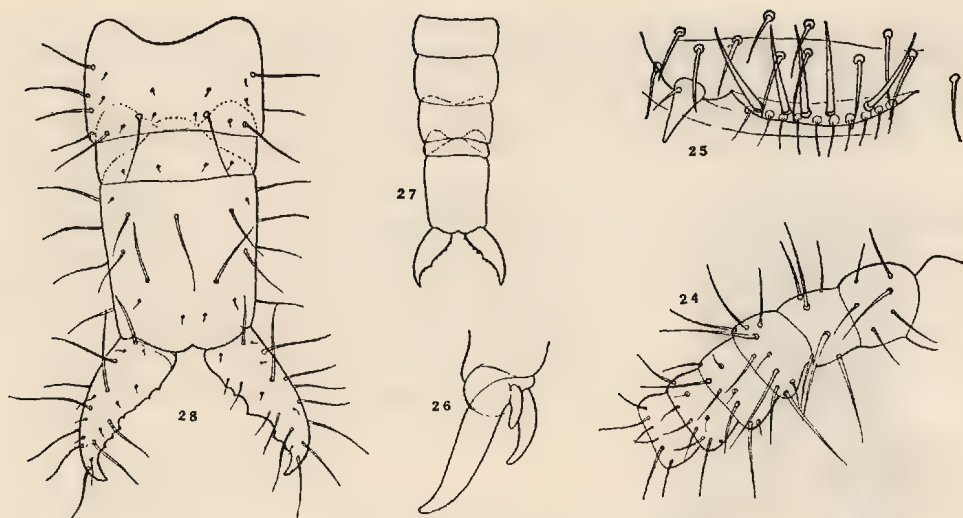
*Japyx glauerti*, n. sp.—15, segment IV. of antennae, showing sensillae; 16, left half of sternite I., showing subcoxal organ; 17, foot; 18-22, postero-lateral corners of tergites IV.-VIII., respectively; 23, segment X. and forceps from above.

#### *Japyx nicholli*, n. sp.

*Description*.—Colour: white, segment X. lightly yellow, forceps a little darker. Head: a little longer than broad, with 16 long setae and a few shorter ones on each side; antennae 26 segmented, III. longer than broad with setae 0.35 mm. long, IV.-VI. with the usual sensory setae but these are relatively short and thick, X. broader than long, ultimate and penultimate segments not longer than broad. Maxillary palpi normal with 4 pectinate inner lamellae and inner process. Labial palpi elongate 60  $\mu$ . long by 20  $\mu$ . wide. Pronotum with 3 very long setae and 4 shorter ones on each side; meso- and metanotum with a pair of fairly long submedial praescutal setae, with 4 very long and 6 shorter and many minute setae on each side, and with only minute postscutal setae; tergite I. with 1 long and 4 short setae, tergite II. with 3 long, 2 short and 5 shorter setae on each side, III.-VII. similar, VIII. with 3 long and a few minute ones on each side, X. with 1 long medial subanterior seta and 6 long setae on each side. Legs and claws normal (*cf.* fig.). First abdominal sternite with subcoxal organ, as figured. Forceps subequal to segment X. in length, asymmetrical, left arm with only moderately large postmedial tooth, between it and the base with sinuous inner margin and five small acute teeth the basal two of which are somewhat longer than the others, postdentally with two small acute teeth; right arm with large slightly postmedial tooth, praedentally with 3 acute teeth, postdentally with one small acute tooth and one rounded tubercle. Length of animal, 5 to 6 mm.

*Syntypes*.—Five specimens collected by Prof. Nicholls and his students at Frankland River, South-West Australia, in January, 1933.

*Remarks*.—While this species is definitely distinct from all others none of the specimens were completely mature, all lacking genital organs.



Figs. 24-28.

*Japyx nicholli*, n. sp.—24, first seven antennal segments; 25, subcoxal organ of first sternite; 26, foot; 27, abdominal segments VI.-X. with forceps; 28, abdominal segments VIII.-X. and forceps more enlarged.

#### Genus HETEROJAPYX Verhoeff., 1904.

The main character separating this genus from others is to be found in the structure of the tarsi. At the base of each claw is a short, stout conical process or empodium. The species of *Heterojapyx* are also, as a rule, of much greater size but, apart from the dentition of the forceps, few specific distinctions are to be found.

#### HETEROJAPYX NOVAE-HOLLANDIAE Verhoeff.

I have before me a specimen of this species collected by Mr. E. S. Gourlay on Dun Mountain, Nelson, New Zealand, on November 29, 1927, at 2,000 feet. It

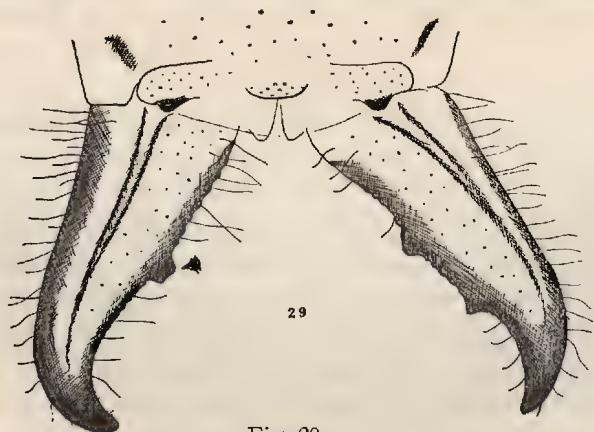


Fig. 29.

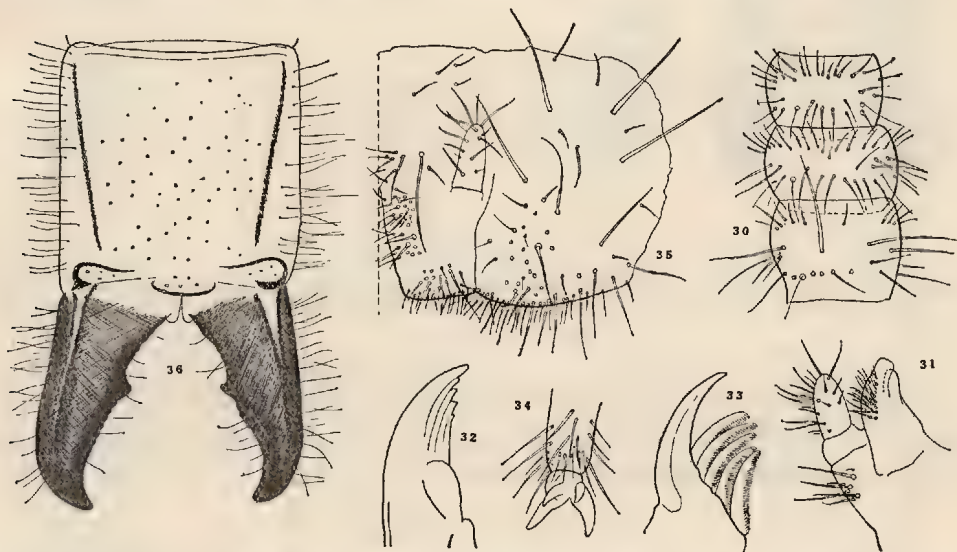
*Heterojapyx novae-hollandiae* Verh. Forceps.

was given to me by Mr. J. W. Evans. Two other specimens were also sent to me by Mr. Gourlay, labelled Nelson, New Zealand, February 22, 1933.

In all three examples the large praemedial tooth of the left arm of the forceps is not acute, as shown in Silvestri's figure, but broad and flattened (*cf.* fig.).

#### *Heterojapyx evansi*, n. sp.

*Description.*—Colour, deep honey yellow, segment X. almost reddish and forceps almost black. Head about as long as wide. Antennae 40-segmented, segments IV.-XIII. with 3-4 sensillary setae, these as long as the ordinary setae. Mandibles strong, with 5 teeth. Maxillae with internal and external lobes as figured. Abdomen: all tergites with their postero-lateral angles rounded. Subcoxal organ of first abdominal sternite as in other species. Legs short and robust, claws as figured. Stylets and vesicles normal. Segment X. slightly longer than wide, with distinct lateral carinae. Forceps very slightly shorter than segment X., with only one large praemedial tooth on each arm, before and after this tooth with a number of small rounded teeth or tubercles. Length of animal, 25-35 mm.



Figs. 30-36.

*Heterojapyx evansi*, n. sp.—30, segments II.-IV. of antennae; 31, external lobe of maxilla; 32, mandible; 33, internal lobe of maxilla; 34, foot; 35, right half of male genital organ showing appendage; 36, forceps and abdominal segment X.

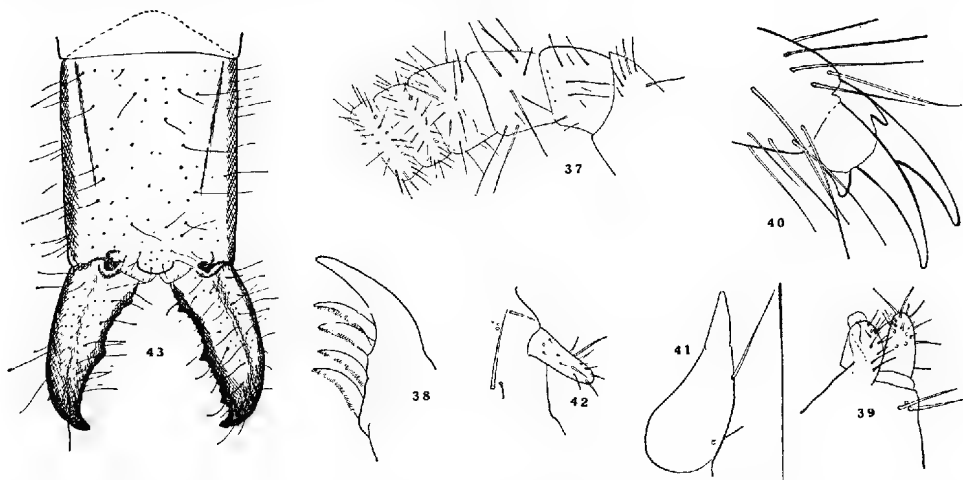
*Type* collected by Mr. J. W. Evans at Condor Creek, F. C. T., in October, 1929. Three other specimens are from Mount Kosciusko, F. C. T., in December, 1929, collected by Dr. R. J. Tillyard.

*Remarks.*—This species is very closely related to *H. victoriae* Silv., but the latter has two large teeth on each arm of the forceps.

#### *Heterojapyx tambourinensis*, n. sp.

*Description.*—Colour of a deep creamy yellow, segment X. almost reddish, forceps still darker. Head slightly longer than broad. Antennae 44-segmented with 3-4 sensory setae on segments IV.-XIII., these setae as long as the ordinary setae. Mandibles strong, with 5 teeth. Internal and external lobes of the maxillae, as figured. Labial palpi elongate 30  $\mu$ . by 90  $\mu$ . (*cf.* fig.). Legs short and robust, with claws as figured for preceding species. Abdomen with all tergites rounded at postero-lateral corners. Subcoxal organ of first sternite as in other species.

Stylets and vesicles normal. Segment X. of abdomen about as long again as wide and much longer than the forceps, with distinct lateral carinae. Forceps asymmetrical, left arm with two large teeth, the first sub-basal, the second praemedial; right arm with three large teeth, one sub-basal, one postmedial and one sub-apical. Length of animal, 28 mm.



Figs. 37-43.

*Heterojapyx tambourinensis*, n. sp.—37, basal antennal segments; 38, internal lobe of maxilla; 39, external lobe of maxilla; 40, foot; 41, stylet; 42, male genital appendage; 43, forceps and abdominal segment X.

The *type* is from Mount Tambourine, Queensland, collected by Mr. A. M. Lea; whilst the second specimen is from Sydney, also collected by Mr. Lea. In neither case is a date given. Both specimens were found in the South Australian Museum collections, mounted dry, on cards.

#### Genus PARAJAPYX Silv.

This genus, together with *Ectasjapyx* Silv., differs from all others in the entire absence of sensory setae on the antennae. The body is elongate and the exsertile vesicles are very large. The forceps are short and stout. In *Parajapyx*, segment IX. of the abdomen is shorter than either VIII. or X.; in *Ectasjapyx* these are equally long.

No species of this genus has previously been recorded from Australia, although *Parajapyx samoanus* was described by Silvestri from Samoa. The following new species is very distinct from *P. samoanus* Silv.

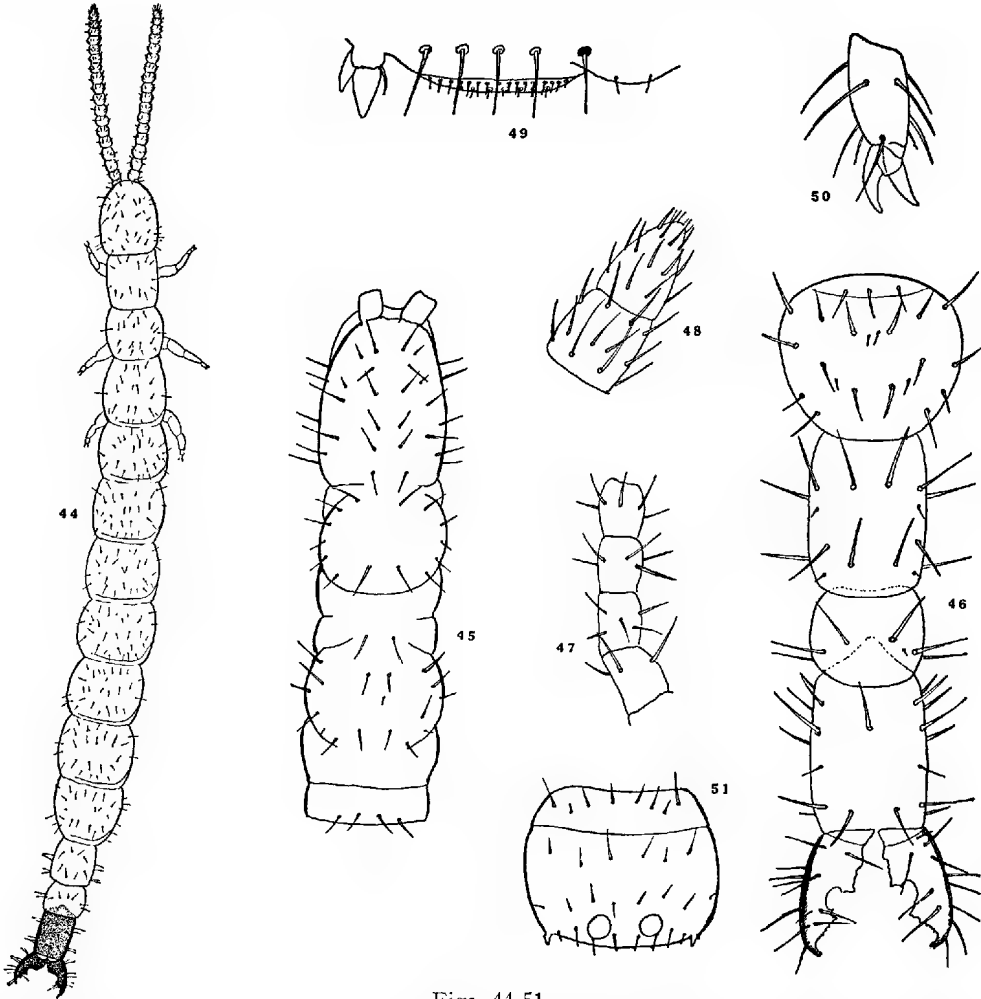
#### *Parajapyx swani*, n. sp.

*Description*.—Colour of a creamy yellow, only the forceps a little darker. Head with approximately 15 setae on each side above. Antennae 18-segmented, with the setae as figured. Thorax: pronotum with 7, meso- and metanotum with 10 setae on each side. Legs with tarsus shorter than praetarsus, median claw short, lateral claws subequal. Abdomen: first sternite with subcoxal organ, as figured. Stylets and exsertile vesicles normal. Segment VIII. about twice as long as IX. and as long as X., the last without lateral carinae. Forceps short and stout, symmetrical, with a very long indentation medially and a large tooth on each side of this indentation, the basal portion of the inner edge is almost straight



with a rather large rounded tooth proximally and then several small serrations, the distal portion of inner margin sinuate. Length of animal, 3-4 mm.

*Syntypes*.—Four specimens from Pinjarra, West Australia, September, 1931, collected by Mr. Swan; other examples from Kelmscott, West Australia, September, 1932 (H. W.), Glen Osmond, South Australia, in garden soil, October, 1929 (J. D.), April, 1932 (D. C. S.), and March, 1933 (H. W.).



Figs. 44-51.

*Parajapyx swani*, n. sp.—44, dorsal view of entire insect; 45, head and thorax I. and II. from above, more enlarged; 46, segments VII.-X. and forceps from above more enlarged; 47, basal antennal segments; 48, two apical antennal segments; 49, subcoxal organ on first abdominal sternite; 50, foot; 51, abdominal segment from below showing vesicles.

KEY TO THE AUSTRALIAN SPECIES OF *JAPYX*.

- |  |    |
|--|----|
| 1. Segment X. of abdomen with distinct lateral carinae.  | 4  |
| Segment X. of abdomen without distinct carinae.  | 2  |
| 2. Forceps asymmetrical.   | 3. |
| Forceps symmetrical. Antennae 24-segmented. Length, 7-8 mm. Tergites V. and VI. rounded, VII. strongly produced at postero-lateral corners. Each arm of forceps with one large praemedial tooth. |    |

*J. westraliense*, n. sp.

3. Antennae 32-segmented. Length of animal, 7-8 mm. Tergite V. slightly, VI. and VII. more produced at postero-lateral corners. Left arm of forceps with a large median tooth, and right arm with a large praemedian tooth. *J. froggatti* Silv.

Antennae 26-segmented. Length of animal, 5-6 mm. Tergites V., VI., and VII. rounded at postero-lateral corners. Left arm of forceps with postmedial tooth; right arm with large slightly postmedial tooth. *J. nichollsi*, n. sp.

4. Large species, 28 mm. Antennae 42-segmented. Forceps asymmetrical, left arm with large postmedial tooth and some fairly large proximal teeth; right arm with large praemedian tooth and a rather large tubercle proximally, from tooth to apex the margin is strongly concave. Tergite IV. slightly produced at the postero-lateral corners, V. strongly and acutely so, VI. and VII. more so, VIII. as in V. *J. glauerti*, n. sp.

Small species not exceeding about 15 mm. 5

5. Antennae 41-segmented. Length of animal, 15 mm. Tergite VI. scarcely produced at postero-lateral corners, VI. strongly produced. Forceps asymmetrical, left arms without large tooth and narrower than right arm; right arm with a large tooth at about one-third from base. *J. longiseta* Silv.

Antennae with fewer segments. 6

6. Antennae with 30 segments. Length of animal, 13 mm. Forceps asymmetrical, left arm with large postmedial tooth; right arm with large praemedian tooth. Tergite V. slightly, VI. slightly, and VII. somewhat more produced at postero-lateral corners. *J. leae* Silv.

Antennae with fewer segments. 7

7. Antennae with 28 segments. Length of animal, 7 mm. Forceps asymmetrical, left arm with large tooth beyond middle, right arm with large praemedian tooth. Tergite V. rounded, VI. shortly, and VII. largely produced at postero-lateral corners. *J. michaelseni* Silv.

Antennae with 26 segments. 8

8. Length of animal, 8 mm. Forceps asymmetrical, left arm with large postmedial tooth, right arm with large praemedian tooth. Tergite V. rounded, VI. slightly, and VII. more produced at postero-lateral corners. *J. tillyardi* Silv.

Length of animal, 8 mm. Forceps asymmetrical, left arm with strongly sinuate inner margin without large tooth, right arm with large submedian tooth. Tergite V. rounded, VI. slightly, and VII. more produced at postero-lateral corners. *J. mjöbergi* Silv.

#### KEY TO THE AUSTRALASIAN SPECIES OF *HETEROJAPYX*.

1. Forceps symmetrical. 2  
 Forceps asymmetrical. 3
2. Forceps with only a large praemedian tooth on each arm. Antennae 40-segmented. Length of animal, 25 mm. *H. evansi*, n. sp.  
 Forceps with two large teeth on each arm, one praemedial and one postmedial. Antennae 39-segmented. Length of animal, 38 mm. *H. victoriae* Silv.
3. Left arm of forceps with a fairly large tooth near the base. 4  
 Left arm of forceps with only a praemedian large tooth. Antennae 39-segmented. *H. novae-hollandiae* Verh.
4. Second large tooth of left arm of forceps median in position; right arm with a sub-basal, a slightly postmedial and a subapical large tooth. Antennae 44-segmented. Length of animal, 28 mm. *H. tambourincensis*, n. sp.  
 Second large tooth of left arm of forceps praemedian in position; right arm with 4 large teeth, one sub-basal, one at one-fourth from base, one postmedial, and one subapical. Antennae? Length of animal, 30-50 mm. *H. gallardi* Till.

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